

Claims

- [c1] 1. A data communications system comprising first and second apparatus, each of said first and second apparatus having a respective port disposed for sending and receiving common channel signaling data for telephone call processing, the first and second apparatus connected by a packet-switched communications channel, said channel of a type routing messages over an arbitrary path comprising hops including a final hop, said channel of a type in which the final hop of a path is not fully known in advance; each of said first and second apparatus further comprising:
- means receiving common channel signaling data via its respective port, encapsulating said common channel signaling data in packets, and transmitting said packets to said packet-switched communications channel;
- each of said first and second apparatus further comprising:
- means receiving said packets from said packet-switched communications channel, stripping flag octet and cyclic redundancy check bits therefrom before encapsulation;
- extracting said common channel signaling data from said packets, and transmitting said common channel

signaling data via its respective port.

[c2] 2. The system of claim 1 wherein the first and second apparatus are further connected by an oncommunications channel; each of said first and second apparatus further comprising means testing the packet-switched communications channel, and responding to a failed test of the packet-switched communications channel by establishing the on-demand communications channel; the means receiving common channel signaling data via the respective port of the first and second apparatus responsive to the failed test by transmitting said encapsulated packets to said on-demand communications channel; the means receiving said packets from said on-demand communications channel responsive to the failed test by extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via the respective ports of said first and second apparatus.

[c3] 3. The system of claim 2 wherein a failed test of the packet-switched communications channel comprises excessive latency in the packet-switched communications channel.

[c4] 4. The system of claim 1 wherein the packet-switched communications channel is a TCP/IP internet.

- [c5] The system of claim 2 wherein the on-demand communications channel is ISDN.
- [c6] 6. The system of claim 1 wherein the common channel signaling information is communicated via Message Transfer Part, Level 2 protocol.
- [c7] 7. A method for use with a data communications system comprising first and second apparatus, each of said first and second apparatus having a respective port disposed for sending and receiving common channel signaling data for telephone call processing, the first and second apparatus connected by a packet-switched communications channel, said channel of a type routing messages over an arbitrary path comprising hops including a final hop, said channel of a type in which the final hop of a path is not fully known in advance; the method performed within each apparatus comprising the steps of: receiving common channel signaling data via the respective port,
stripping flag octet and cyclic redundancy check bits therefrom before encapsulation;
encapsulating said common channel signaling data in packets, and
transmitting said packets to said packet-switched communications channel; said method performed within

each apparatus further comprising the steps of:
receiving said packets from said packet-switched communications channel,
extracting said common channel signaling data from said packets, and
transmitting said common channel signaling data via the respective port.

[c8] 8. The method of claim 7 wherein the first and second apparatus are further connected by an oncommunications channel; said method further comprising the steps of testing the packet-switched communications channel, responding to a failed test of the packet-switched communications channel by establishing the on-demand communications channel; receiving common channel signaling data via the respective port of the first and second apparatus and transmitting said encapsulated packets to said on-demand communications channel; receiving said packets from said on-demand communications channel and extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via the respective ports of said first and second apparatus.

[c9] 9. A data communications system comprising first and second apparatus at distant physical locations, said first and second apparatus communicatively coupled through

a wide-area network having a wide-area-network message protocol;

each of said first and second apparatus comprising a port sending and receiving common channel signaling messages, each of said first and second apparatus further comprising means for encapsulating said common channel signaling messages within messages conforming to said wide-area-network protocol, and means for un-encapsulating said common channel signaling messages from within messages received from said wide-area network;

each of said first and second apparatus further comprising a routing table defining destinations for said common channel signaling messages depending on the contents thereof, and computational means routing common channel signaling messages among said first and second apparatus as determined by said routing table;

each of said first and second apparatus further comprising means responsive to received messages for updating the respective routing table.

- [c10] 10. The system of claim 9 wherein each of said first and second apparatus further comprises cryptographic means encrypting messages communicated to said wide-area network and decrypting messages communicated from said wide-area network.

[c11] 11. The system of claim 9 wherein each said port sending and receiving common channel signaling messages is a synchronous port, and wherein said wide-area network is a packet switched network.

[c12] 12. The system of claim 11 wherein said wide-area network is an internet.

[c13] 13. A method for use with a data communications system comprising first and second apparatus at distant physical locations, said first and second apparatus communicatively coupled through a wide-area network having a wide-area-network message protocol; each of said first and second apparatus comprising first and second ports sending and receiving common channel signaling messages, each of said first and second apparatus further comprising a routing table defining destinations for said common channel signaling messages depending on the contents thereof; said method comprising the steps of:

receiving an update message via said wide-area network and updating said routing table in response thereto;
receiving a first common channel signaling message at said first apparatus at its first port;
selecting said second port responsive to said routing table and responsive to contents of said first message;

transmitting said first message at said second port.

[c14] 14. A method for use with a data communications system comprising first and second apparatus at distant physical locations, said first and second apparatus communicatively coupled through a wide-area network having a wide-area-network message protocol; each of said first and second apparatus comprising a respective port sending and receiving common channel signaling messages, each of said first and second apparatus further comprising a routing table defining destinations for said common channel signaling messages depending on the contents thereof; said method comprising the steps of: receiving an update message via said wide-area network and updating said routing table in response thereto; receiving a first common channel signaling message at said first apparatus at its respective port; selecting said wide-area network responsive to said respective routing table and responsive to contents of said first message; encapsulating said first message in a second message of said wide-area-network message protocol; and transmitting said first message to said wide-area network.

[c15] 15. The method of claim 14 further comprising the steps of:

receiving said second message at said second apparatus from said wide-area network;
unencapsulating a third message from said second message;
selecting the respective port of said second apparatus responsive to said respective routing table and responsive to contents of said third message; and
transmitting said third message to said port of said second apparatus.

- [c16] 16. A data communications system comprising first and second apparatus, each of said first and second apparatus having a respective port disposed for sending and receiving common channel signaling data for telephone call processing, the first and second apparatus connected by a packet-switched communications channel, said channel of a type routing messages over an arbitrary path comprising hops including a final hop, said channel of a type in which the final hop of a path is not fully known in advance; each of said first and second apparatus further comprising:
means receiving common channel signaling data via its respective port, reversibly transforming said data, encapsulating said transformed common channel signaling data in packets, and transmitting said packets to said packet-switched communications channel;

each of said first and second apparatus further comprising:

means receiving said packets from said packet-switched communications channel, extracting said common channel signaling data from said packets, reverse-transforming said data, and transmitting said common channel signaling data via its respective port.

[c17] 17. The system of claim 16 wherein the reversible transformation is compression.

[c18] 18. The system of claim 16 wherein the reversible transformation is encryption.

[c19] 19. The system of claim 16 wherein the first and second apparatus are further connected by an oncommunications channel; each of said first and second apparatus further comprising means testing the packet-switched communications channel, and responding to a failed test of the packet-switched communications channel by establishing the on-demand communications channel; the means receiving common channel signaling data via the respective port of the first and second apparatus responsive to the failed test by transmitting said encapsulated packets to said on-demand communications channel; the means receiving said packets from said on-demand communications channel responsive to the

failed test by extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via the respective ports of said first and second apparatus.

- [c20] 20. The system of claim 19 wherein a failed test of the packet-switched communications channel comprises excessive latency in the packet-switched communications channel.
- [c21] 21. The system of claim 16 wherein the packet-switched communications channel is a TCP/IP internet.
- [c22] 22. The system of claim 19 wherein the on-demand communications channel is ISDN.
- [c23] 23. The system of claim 16 wherein the common channel signaling information is communicated via Message Transfer Part, Level 2 protocol.
- [c24] 24. A method for use with a data communications system comprising first and second apparatus, each of said first and second apparatus having a respective port disposed for sending and receiving common channel signaling data for telephone call processing, the first and second apparatus connected by a packet-switched communications channel, said channel of a type routing messages over an arbitrary path comprising hops includ-

ing a final hop, said channel of a type in which the final hop of a path is not fully known in advance; the method performed within each apparatus comprising the steps of:

receiving common channel signaling data via the respective port,

reversibly transforming said data;

encapsulating said transformed common channel signaling data in packets, and

transmitting said packets to said packet-switched communications channel; said method performed within each apparatus further comprising the steps of:

receiving said packets from said packet-switched communications channel,

extracting said common channel signaling data from said packets,

said data, and

transmitting said common channel signaling data via the respective port.

[c25] 25. The method of claim 24 wherein the reversible transformation is compression.

[c26] 26. The method of claim 24 wherein the reversible transformation is encryption.

[c27] 27. The method of claim 24 wherein the first and second

apparatus are further connected by an oncommunications channel; said method further comprising the steps of testing the packet-switched communications channel, responding to a failed test of the packet-switched communications channel by establishing the on-demand communications channel; receiving common channel signaling data via the respective port of the first and second apparatus and transmitting said encapsulated packets to said on-demand communications channel; receiving said packets from said on-demand communications channel and extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via the respective ports of said first and second apparatus.

- [c28] 28. A data communications system comprising first and second apparatus, each of said first and second apparatus having a respective port disposed for sending and receiving common channel signaling data for telephone call processing, the first and second apparatus connected by a packet-switched communications channel, said channel of a type routing messages over an arbitrary path comprising hops including a final hop, said channel of a type in which the final hop of a path is not fully known in advance; each of said first and second apparatus further comprising:

means receiving common channel signaling data via its respective port, encapsulating said common channel signaling data in packets, and transmitting said packets to said packet-switched communications channel;

each of said first and second apparatus further comprising:

means receiving said packets from said packet-switched communications channel, extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via its respective port;

the system having associated with it a first point code or point codes, the received common channel signaling data having associated with it a second point code, said system further comprising means comparing the first point code or point codes with the second point code.

- [c29] 29. The system of claim 28 wherein the first and second apparatus are further connected by an oncommunications channel; each of said first and second apparatus further comprising means testing the packet-switched communications channel, and responding to a failed test of the packet-switched communications channel by establishing the on-demand communications channel; the means receiving common channel signaling data via the respective port of the first and second apparatus re-

sponsive to the failed test by transmitting said encapsulated packets to said on-demand communications channel; the means receiving said packets from said on-demand communications channel responsive to the failed test by extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via the respective ports of said first and second apparatus.

- [c30] 30. The system of claim 29 wherein a failed test of the packet-switched communications channel comprises excessive latency in the packet-switched communications channel.
- [c31] 31. The system of claim 28 wherein the packet-switched communications channel is a TCP/IP internet.
- [c32] 32. The system of claim 29 wherein the on-demand communications channel is ISDN.
- [c33] 33. The system of claim 28 wherein the common channel signaling information is communicated via Message Transfer Part, Level 2 protocol.
- [c34] 34. A method for use with a data communications system comprising first and second apparatus, each of said first and second apparatus having a respective port disposed for sending and receiving common channel sig-

naling data for telephone call processing, the first and second apparatus connected by a packet-switched communications channel, said channel of a type routing messages over an arbitrary path comprising hops including a final hop, said channel of a type in which the final hop of a path is not fully known in advance; the system having associated with it a first point code or point codes; the method performed within each apparatus comprising the steps of:

receiving common channel signaling data via the respective port,

determining a second point code associated with the received common channel signaling data;

comparing the second point code with the first point code or point codes;

encapsulating said common channel signaling data in packets, and

transmitting said packets to said packet-switched communications channel; said method performed within each apparatus further comprising the steps of:

receiving said packets from said packet-switched communications channel,

extracting said common channel signaling data from said packets, and

transmitting said common channel signaling data via the respective port.

[c35] 35. The method of claim 34 wherein the first and second apparatus are further connected by an oncommunications channel; said method further comprising the steps of testing the packet-switched communications channel, responding to a failed test of the packet-switched communications channel by establishing the on-demand communications channel; receiving common channel signaling data via the respective port of the first and second apparatus and transmitting said encapsulated packets to said on-demand communications channel; receiving said packets from said on-demand communications channel and extracting said common channel signaling data from said packets, and transmitting said common channel signaling data via the respective ports of said first and second apparatus.